

What is claimed is:

1. An electroless-plating liquid for selectively forming a plated film on a surface of an exposed interconnect of a semiconductor device having an embedded interconnect structure, said electroless-plating liquid comprising cobalt ions, a complexing agent, and a reducing agent free from alkali metal.

2. The electroless-plating liquid according to claim 1, wherein said reducing agent comprises an alkylamine borane.

3. The electroless-plating liquid according to claim 1, further comprising at least one of a stabilizer selected from one or more kinds of heavy metal compounds and sulfur compounds, and a surfactant.

4. The electroless-plating liquid according to claim 1, wherein a pH of said electroless-plating liquid is adjusted within the range from 5 to 14 using a pH adjusting agent free from alkali metal.

5. An electroless-plating liquid for selectively forming a plated film on a surface of an exposed interconnect of a semiconductor device having an embedded interconnect structure, said electroless-plating liquid comprising cobalt ions, a complexing agent, a compound containing a refractory metal, and a reducing agent free from alkali metal.

6. The electroless-plating liquid according to claim 5, wherein said refractory metal comprises at least one of tungsten and molybdenum.

5           7. The electroless-plating liquid according to claim 5, wherein said reducing agent comprises an alkylamine borane.

8. The electroless-plating liquid according to claim 5, further comprising at least one of a stabilizer selected from one or more kinds of heavy metal compounds and sulfur compounds, and a surfactant.

9. The electroless-plating liquid according to claim 5, wherein a pH of said electroless-plating liquid is adjusted within the range from 5 to 14 using a pH adjusting agent free from alkali metal.

10. A semiconductor device having an embedded interconnect structure of copper, copper alloy, silver or silver alloy interconnect, wherein a surface of an exposed interconnect is selectively covered with a protective film, said protective film being formed by an electroless-plating process with use of an electroless-plating liquid, said electroless-plating liquid comprising cobalt ions, a complexing agent, and a reducing agent free from alkali metal.

11. The semiconductor device according to claim 10, wherein said reducing agent comprises an alkylamine borane.

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12. The semiconductor device according to claim 10, wherein said electroless-plating liquid further comprises at least one of a stabilizer selected from one or more kinds of heavy metal compounds and sulfur compounds, and a surfactant.

13. The semiconductor device according to claim 10, wherein a pH of said electroless-plating liquid is adjusted within the range from 5 to 14 using a pH adjusting agent free from alkali metal.

14. A semiconductor device having an embedded interconnect structure of copper, copper alloy, silver or silver alloy interconnect, wherein a surface of an exposed interconnect is selectively covered with a protective film, said protective film being formed by an electroless-plating process performed with use of an electroless-plating liquid, said electroless-plating liquid comprising cobalt ions, a complexing agent, a compound containing a refractory metal, and a reducing agent free from alkali metal.

15. The semiconductor device according to claim 14, wherein said refractory compound comprises at least one of tungsten and molybdenum.

16. The semiconductor device according to claim 14, wherein said reducing agent comprises an alkylamine borane.

17. The semiconductor device according to claim 14, wherein said electroless-plating liquid further comprises at least one of

a stabilizer selected from one or more kinds of heavy metal compounds and sulfur compounds, and a surfactant.

18. The semiconductor device according to claim 14, wherein  
5 a pH of said electroless-plating liquid is adjusted within the range from 5 to 14 using a pH adjusting agent free from alkali metal.

19. A semiconductor device having an embedded interconnect structure, wherein a surface of an exposed interconnect is  
10 selectively covered with a protective film of a metal comprising cobalt.

20. The semiconductor device according to claim 19, wherein  
15 said protective film has a thickness within the range from 0.1 to 500 nm.

21. A semiconductor device having an embedded interconnect structure, wherein a surface of an exposed interconnect is  
20 selectively covered with a protective film of an alloy comprising cobalt and a refractory metal.

22. The semiconductor device according to claim 21, wherein  
25 said refractory metal comprises at least one of tungsten and molybdenum.

23. The semiconductor device according to claim 21, wherein  
said protective film has a thickness within the range from 0.1 to 500 nm.